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Calculations of a Compact Ni-like Tungsten Soft X-ray Laser*

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We propose a scheme for a compact nickel-like tungsten soft x-ray laser operating on the 4d-4p, J=0-1 transition at 43.1 Å. High gains are achieved by operating at high electron densities ($n_e > 10^{22} \text{ cm}^{-3}$) for short times ($t < \text{psec}$). In this regime the gain during non-equilibrium ionization can greatly exceed that of the steady state. The duration of this transient gain is on the order of the ionization time which makes picosecond-pulsed high-intensity ($I > 10^{16} \text{ W/cm}^2$) optical pumps ideal. Target designs including solid tungsten targets and high Z-foams are considered. Techniques to maximize the spatial extent of the gain and techniques of minimizing refraction of the x-rays are discussed.

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